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RESEARCH ARTICLE

Subjective cognitive decline higher among sexual and gender minorities in the United States, 2015–2018

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Abstract

Introduction: Subjective cognitive decline (SCD) represents self-reported problems with memory, a possible early sign of dementia. Little is known about SCD among sexual and gender minority (SGM) adults who identify as lesbian, gay, bisexual, and/or transgender or gender non-binary.

Methods: Data were weighted to represent population estimates from 25 states' 2015–2018 Behavioral Risk Factor Surveillance System to describe SCD in adults ≥45 years by SGM status. Logistic regression tested associations between demographic and health conditions.

Results: SCD prevalence was higher in SGM (15.7%; 95% confidence interval [CI]:13.1–18.2) than in non-SGM adults (10.5%; 95% CI:10.1–10.9; $P < .0001$). SGM adults with SCD were also more likely to report functional limitations due to SCD than non-SGM adults with SCD, 60.8% versus 47.8%, $P = .0048$. Differences in SCD by SGM status were attenuated after accounting for depression.

Discussion: Higher prevalence of SCD in SGM adults highlights the importance of ensuring inclusive screenings, interventions, care services, and resources for SGM adults.

KEYWORDS
population-based sample, preclinical Alzheimer's disease, screening, sexual and gender minorities, subjective cognitive decline

1 | BACKGROUND

Subjective cognitive decline (SCD) represents a self-reported experience of worsening or more frequent confusion or memory loss.[1] Of adults aged 45 years old and older in the United States, 11.2% experience SCD,[2] and it may be one of the first indicators of mild cognitive impairment (MCI) and future progression to Alzheimer's disease and related dementias (ADRD).[3,4] Individuals with SCD are two times more likely to develop future cognitive decline and nearly 11% will progress to dementia over 5 years.[3] However, SCD may also be due to other health concerns, such as medication side effects, vitamin deficiencies, and depression.[5,6]

Sexual and gender minority (SGM) is an umbrella term that represents people who identify as lesbian, gay, bisexual (sexual minorities), and/or transgender or gender non-binary, as well as people with a gender identity, gender expression, or reproductive development that varies from traditional, societal, cultural, or physiological norms (gender minorities).[7] The term transgender or gender non-binary represents individuals who self-identify with a gender identity that does not align with their sex assigned to them at birth, while cisgender refers to

RESEARCH IN CONTEXT

1. Systematic review: In our literature review using PubMed, few studies examined subjective cognitive decline (SCD) in sexual and gender minorities (SGM). While SGM adults experience greater physical and mental health challenges compared to non-SGM adults, most aging studies have not collected data on sexual orientation and gender identity. Population-based studies examining risk of SCD among diverse populations including SGM are needed.

2. Interpretation: SCD was higher for SGM middle-aged and older adults compared to their non-SGM counterparts. SGM adults reported greater functional limitations due to SCD than non-SGM adults. Differences in SCD by SGM identity were attenuated after accounting for depression, which was higher among SGM than non-SGM adults.

3. Future directions: Better understanding the risk of SCD among SGM adults, especially subgroups such as transgender adults and racial/ethnic minorities, is needed. Future efforts aimed at creating inclusive and welcoming aging services for SGM adults living with cognitive impairment should be considered.

HIGHLIGHTS

- Subjective cognitive decline (SCD) prevalence was higher in sexual and gender minority (SGM) than in non-SGM adults.
- Differences in SCD by SGM status were attenuated after accounting for demographic characteristics, health status, and depression.
- SGM adults with SCD reported greater functional limitations due to SCD than non-SGM adults with SCD.

2 | METHODS

2.1 | Study population

The study population consisted of US adults aged ≥45 years who were administered both the optional Cognitive Decline and Sexual Orientation and Gender Identity (SOGI) modules as part of the Behavioral Risk Factor Surveillance System (BRFSS) from 2015 to 2018. BRFSS is a state-based, random-digit-dial telephone survey of both cellphone and landline respondents conducted in all 50 states, the District of Columbia (DC), and several US territories.[15] While all states participate in BRFSS and administer core questions, states choose when and how often they will administer optional modules, include the Cognitive Decline and SOGI modules.

2.2 | Study design

Data from the 2015–2018 BRFSS were used to examine the prevalence of SCD among SGM and non-SGM adults aged ≥45 years. While the SOGI optional module is administered to all BRFSS respondents aged ≥18 years, the Cognitive Decline module—edited into its current form in 2015—is only administered in adults aged ≥45 years. As a result, only adults ≥45 years were examined in this analysis. States may have administered the modules during more than one year. For those states, only the most recent year of data were included in this study. There were 25 states included in this study that administered both the Cognitive Decline and SOGI module in the same year at least once: Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nevada, New York, Ohio, Pennsylvania, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

2.3 | Measures

As part of the Cognitive Decline optional module, six questions on SCD were asked of adults aged ≥45 years. To categorize respondents' SCD status they were asked, "During the past 12 months, have you experienced confusion or memory loss that is happening more often

individuals with a gender identity that aligns with their sex assigned at birth. For this paper, non-SGM refers to individuals who identify both as heterosexual and cisgender.

Studies have shown that health disparities exist between SGM and non-SGM adults, and that these disparities can be risk factors for cognitive decline, and potentially, ADRD. This includes higher rates of cardiovascular disease, hypertension, diabetes, and depression compared to non-SGM older adults.[8–10] While there are limited population-based studies on the risk for cognitive decline and ADRD among SGM adults, research has found a higher or similar prevalence of SCD, cognitive impairment, and ADRD among SGM adults compared to non-SGM adults.[11–13] A study using 2015 Medicare claims data of beneficiaries aged ≥65 years found the prevalence of diagnosed dementia was 18.2% for transgender (limited to those with an International Classification of Diseases, Ninth Edition, Clinical Modification [ICD-9-CM] code for transsexualism/gender identity disorder) and 12.2% for cisgender beneficiaries.[14] Another study found up to 50% of SGM older adults reported moderate to severe SCD, with rates being higher among SGM people who identified as a racial/ethnic minority.[12] SGM adults with SCD were also more likely to report depression and functional limitations.[11]

The primary objective of this study was to describe the prevalence of SCD among SGM middle-aged and older adults. We also sought to compare prevalence rates by SGM status; and determine if differences could be explained by differences in demographics, chronic health conditions, functional limitations, physical unhealthy days, and depression.

or is getting worse?" Participants who responded yes were asked four additional questions about how often they (1) had to give up day-to-day household activities or chores such as cooking, cleaning, driving, or paying bills due to SCD; (2) needed assistance with these day-to-day activities due to SCD; (3) received the required assistance for those day-to-day activities; and (4) believed that their SCD interfered with their ability to work, volunteer, or engage in social activities outside the home. For these four questions, respondents who reported always, usually, or sometimes endorsing these behaviors were grouped together in the analysis for each individual question. Those that responded rarely or never were also grouped together. Respondents who reported always, usually, or sometimes giving up day-to-day activities due to SCD or reported SCD always, usually, or sometimes interfering with their ability to work, volunteer, or engage in social activities were categorized as having one or more SCD-related functional limitations. A fifth question asked if they had talked to a health-care professional about their confusion or memory loss.

For SGM status, two questions were used to assess SOGI, and respondents had to answer both questions to be included in the study. For sexual orientation, participants had the option of responding as straight/heterosexual, lesbian or gay, bisexual, or other. For gender identity, participants who reported that they identified as transgender were asked if they consider themselves as male-to-female transgender, female-to-male transgender, or gender non-conforming using categories provided by the interviewer. We classified respondents as SGM if they reported that they were lesbian, gay, bisexual, or other sexual orientation or if they identified as transgender male, transgender female, or gender non-conforming. Respondents who did not identify as transgender were classified as cisgender. Those who were cisgender and straight/heterosexual were classified as non-SGM. Respondents who refused to answer or responded that they did not know the answer to the SOGI questions were not included in this analysis.

BRFSS also includes questions on demographic characteristics and health status. Health status measures include self-rated health (classified as excellent, very good, or good vs. fair or poor) and physically unhealthy days (categorized at 14 days or more vs. less than 14 days in the past 30 days).[16,17] Respondents also report whether they have ever been diagnosed with specific health conditions. In this study, we focused on those known to be related to SCD or ADRD risk: self-reported depressive disorder, diabetes, and heart disease.[6,11,12] Finally, respondents report whether they have functional limitations in specific domains.[18] We focused on three limitations: difficulty doing errands alone, difficulty dressing or bathing, and difficulty walking or climbing stairs. We created indicators for whether respondents experienced any of these three (any limitation) and whether they reported two or more difficulties (functional limitations).

2.4 | Statistical analysis

Prevalence and 95% confidence intervals (CIs) for SCD by SGM identity were estimated overall, and separately by SOGI. BRFSS weighting methodology included both design weights and raking for all 25 states

included in the study. Raking involved iterative proportional fitting that adjusts for demographic differences between BRFSS survey participants and estimates of the population they represent.[19] We calculated the relative standard error (RSE) as the weighted standard error divided by the weighted percentage, multiplied by 100. RSE > 30.0% indicates estimates that may be unreliable. We explored differences in sociodemographic characteristics (age group, race/ethnicity, education, employment status, marital status, and income) by SGM identity. We used Chi-square tests to compare weighted proportions. Adjusted prevalence ratios (aPRs) and CIs were calculated to examine associations between sociodemographic and health characteristics and SCD. Finally, SCD-related functional limitations and talking with a health-care professional about SCD were examined by SGM identity. Logistic regression was conducted to test associations between demographic variables (Model 1), physical health conditions (Model 2), and depression (Model 3), with results presented as aPRs and 95% CIs. Data were weighted to represent state-level population estimates. Analyses were conducted using SAS 9.4 (SAS Institute) using survey procedures to account for weighted survey data and SAS-callable SUDAAN 11.0 (RTI International).

3 | RESULTS

From 2015 to 2018, 119,128 respondents aged ≥45 years across 25 states provided complete data on both SOGI and SCD. Of those, 3.2% identified as SGM and 96.8% identified as heterosexual and cisgender, or non-SGM (Table 1). Among SGM adults, about 17% identified as lesbian, cisgender females; 25% gay, cisgender males; 32% bisexual, cisgender males or females; 14% identified their sexual orientation as other and were cisgender males or females; and 12.4% identified as transgender or non-binary (of whom 81.0% identified as heterosexual, 2.2% as lesbian or gay, 11.8% as bisexual, and 5.0% another sexual orientation). SGM adults differed in terms of several demographic, economic, and health indicators, including being slightly younger (mean age: 59.9 vs. 61.3 years, P < .001), and more likely to identify as racial/ethnic minority (28.2% vs. 22.6, P = .0008), with more SGM adults identifying as Hispanic, Latina/o, or Spanish, or another racial/ethnic minority group. SGM adults were also more likely to not be married (62.0% vs. 38.3%, P < .0001), more likely to live alone (33.1% vs. 23.9%, P < .0001), and more likely report an annual household income less than $20,000 (23.1% vs. 15.5%, P < .0001) compared to non-SGM adults.

SGM adults were more likely to report poor or fair self-rated health (27.2% vs. 21.2%, P < .0001), diabetes (20.8% vs. 16.7%, P = .0034), or a depressive disorder (28.0% vs. 17.4%, P < .0001; Table 2). In addition, SGM adults were more likely to report having a functional limitation in each of the three areas assessed (difficulties doing errands alone, dressing or bathing, or walking or climbing stairs), with higher difficulties in at least one of these areas (29.4% vs. 22.2%; P < .0001), and two or more difficulties (13.3% vs. 8.0%; P < .0001).

The unadjusted prevalence of SCD by SOGI is listed in Table 3. Non-SGM males (10.7%) and females (10.4%) had the lowest prevalence of

TABLE 1 Demographics for those aged ≥45 years from 25 states who completed both the subjective cognitive decline and sexual orientation and gender identity (SOGI) optional modules, BRFSS 2015–2018

Variable	Sexual and gender minority adults (Weighted n = 1,882,629)			Heterosexual, cisgender adults (Weighted n = 57,855,821)			
	Unweighted[1] n	% (95% CI)	RSE	Unweighted[1] n	% (95% CI)	RSE	P
SOGI							
Heterosexual, cisgender, male	–	–		47,786	46.2 (45.7–46.8)	0.64%	
Heterosexual, cisgender, female	–	–		67,822	53.8 (53.2–54.3)	0.55%	
Lesbian, cisgender female	625	16.7 (14.3–19.1)	7.26%	–	–		
Gay, cisgender male	891	25.3 (22.6–28.1)	5.56%	–	–		
Bisexual, cisgender individual	1121	31.6 (28.2–34.6)	4.9%	–	–		
"Other," cisgender, male or female*	442	14.0 (11.6–16.4)	8.88%	–	–		
Transgender individuals (all sexual orientations)	441	12.4 (10.5–14.3)	7.89%	–	–		
Age, in years (Mean ± SD)[2]		59.9 ± 0.3			61.3 ± 0.06		<.0001
Age categories							<.0001
45–59 years	1599	53.5 (50.3–56.7)	3.05%	41,852	47.2 (46.6–47.7)	0.63%	
60–64	587	17.7 (15.2–20.1)	7.03%	18,774	16.0 (15.6–16.4)	1.31%	
65–74	814	16.1 (14.0–18.3)	6.80%	32,972	22.0 (21.6–22.5)	1.01%	
75–79	227	5.3 (4.1–6.5)	11.86%	10,038	7.1 (6.9–7.4)	1.90%	
>80	293	7.4 (5.8–9.1)	11.26%	11,972	7.7 (7.4–7.9)	1.79%	
Race/ethnicity							<.0001
White, Non-Hispanic (NH)	2847	71.8 (68.4–75.2)	2.43%	96,931	77.4 (76.8–77.9)	0.38%	
Black, NH	217	9.9 (7.9–11.8)	10.27%	7667	10.9 (10.5–11.4)	2.08%	
Other racial/ethnic minorities, NH	128	5.6 (3.4–7.9)	20.68%	3820	3.6 (3.3–3.9)	4.08%	
Multiracial, NH	88	1.0 (0.6–1.4)	19.98%	2229	1.1 (1.0–1.2)	5.02%	
Latinx, Hispanic	174	11.7 (8.9–14.4)	11.95%	3423	7.0 (6.6–7.4)	2.89%	
Racial/ethnic minority	607	28.2 (24.8–31.6)	6.18%	17,139	22.6 (22.1–23.2)	1.30%	.0008
Marital status							<.0001
Married	1235	38.0 (34.9–41.1)	4.18%	64,801	61.7 (61.1–62.3)	0.47%	
Divorced	572	13.4 (11.4–15.4)	7.45%	18,794	14.8 (14.3–15.2)	1.36%	
Widowed	410	9.9 (7.8–12.0)	10.76%	19,245	12.0 (11.7–12.4)	1.45%	
Separated	75	3.7 (2.7–5.1)	19.68%	1988	2.2 (2.0–2.4)	4.48%	
Never married	947	25.8 (23.0–28.6)	5.43%	8623	7.5 (7.2–7.9)	2.31%	
Member of an unmarried couple	248	9.2 (7.0–11.4)	12.31%	1603	1.7 (1.6–1.9)	5.09%	
Not married	2252	62.0 (58.9–65.1)	2.56%	50,253	38.3 (37.7–38.9)	0.76%	<.0001
Socioeconomic position							
Educational attainment							<.0001
Some high school or less	279	15.9 (13.1–18.7)	8.99%	7340	11.3 (10.8–11.7)	1.99%	
High school graduate	875	25.3 (22.4–28.3)	5.85%	33,173	29.6 (29.1–30.1)	0.91%	
Some college	807	24.6 (21.9–27.3)	5.58%	31,329	30.3 (29.7–30.8)	0.93%	
College graduate	1545	34.1 (31.2–37.0)	4.33%	43,515	28.9 (28.4–29.3)	0.86%	
High school graduate or less	1154	41.2 (40.0–44.6)	4.09%	40,513	40.9 (40.3–41.5)	0.72%	.8313

(Continues)

TABLE 1 (Continued)

Variable	Sexual and gender minority adults (Weighted n = 1,882,629)			Heterosexual, cisgender adults (Weighted n = 57,855,821)			
	Unweighted[1] n	% (95% CI)	RSE	Unweighted[1] n	% (95% CI)	RSE	P
Employment status							<.0001
Employed	1525	48.4 (45.2–517)	3.43%	48,051	48.2 (47.6–48.8)	0.62%	
Out of work	147	5.1 (3.8–6.4)	13.36%	3672	4.0 (3.8–4.3)	3.24%	
Homemaker	92	3.0 (1.7–4.3)	22.13%	5682	5.4 (5.1–5.7)	2.55%	
Retired	1267	27.9 (25.2–30.5)	4.85%	48,062	33.4 (32.9–33.9)	0.79%	
Unable to work	465	15.5 (12.9–18.1)	8.48%	9333	8.7 (8.3–9.0)	2.05%	
Not working	1977	51.6 (48.3–54.8)	3.22%	66,999	51.8 (51.2–52.4)	0.57%	.8868
Live alone	1530	33.1 (30.2–36.1)	4.54%	38,999	23.9 (23.4–24.4)	0.99%	<.0001
Annual household income							<.0001
<$20K	694	23.1 (20.2–26.1)	6.54%	15,647	15.5 (15.0–16.0)	1.60%	
$20K to < $50K	1077	35.2 (31.8–38.6)	4.93%	33,349	32.2 (31.6–32.8)	0.95%	
>$50K	1350	41.7 (38.4–45.0)	4.03%	48,753	52.2 (51.6–52.9)	0.62%	
Low income (< $20K)	694	23.1 (20.2–26.1)	6.54%	15,647	15.5 (15.0–16.0)	1.60%	<.0001
Health insurance, uninsured	3321	7.5 (5.49–9.51)	13.68%	110,868	5.79 (5.45-6.13)	2.97%	.0660

Note: [1]Not all categories will sum to the weighted sample size because of missing response values.; [2]Weighted; Cisgender = non-transgender or gender identity aligns with sex assigned at birth; *Other = sexual orientations defined as another sexual orientation; Transgender individuals = transgender women, transgender men, and gender nonbinary adults.
Abbreviations: BRFSS, Behavioral Risk Factor Surveillance System; CI, confidence interval; NH, non-Hispanic; RSE, relative standard error; SOGI, sexual orientation and gender identity.

TABLE 2 Health characteristics of those aged ≥45 years from 25 states who completed both the subjective cognitive decline and sexual orientation and gender identity (SOGI) optional modules, BRFSS 2015–2018

Variable	Sexual and gender minority adults (weighted n = 1,882,629)			Heterosexual, cisgender adults (weighted n = 57,855,821)			
	Unweighted n	% (95% CI)	RSE	Unweighted n	% (95% CI)	RSE	P
Chronic conditions and health							
Self-rated health, poor or fair	912	27.2 (24.2–30.2)	5.64%	23,735	21.2 (20.7–21.7)	1.18%	<.0001
Frequent physical unhealthy days (≥14 days)	593	15.7 (13.4–18.1)	7.67%	16,608	14.3 (13.9–14.7)	1.45%	.2276
Diabetes	680	20.8 (17.9–23.6)	7.03%	19,515	16.7 (16.3–17.2)	1.38%	.0034
Heart disease (heart attack, angina, or coronary heart disease)	425	12.7 (10.1–15.2)	10.22%	13,427	10.7 (10.4–11.1)	1.70%	.1125
Depressive disorder	1,096	28.0 (25.3–30.6)	4.87%	21,251	17.4 (16.9–17.8)	1.28%	<.0001
Functional status							
Any limitation	990	29.4 (26.3–32.4)	5.34%	26,566	22.2 (21.7–22.7)	1.13%	<.0001
Difficulty doing errands alone	404	13.0 (10.6–15.4)	9.44%	9535	8.1 (7.8–8.5)	2.02%	<.0001
Difficulty dress or bathing	231	8.7 (6.4–11.0)	13.68%	5534	4.8 (4.6–5.1)	2.77%	<.0001
Difficulty walking or climbing	893	27.1 (24.1–30.1)	5.70%	24,161	20.1 (19.6–20.5)	1.20%	<.0001
Functional limitations (2+ difficulties)	388	13.3 (10.7–15.8)	9.77%	9378	8.0 (7.7–8.3)	2.04%	<.0001

Abbreviations: BRFSS, Behavioral Risk Factor Surveillance System; CI, confidence interval; RSE, relative standard error; SOGI, sexual orientation and gender identity.

SCD followed by gay, cisgender males (11.2%); then cisgender individuals who reported their sexual orientation as other (16.5%); lesbian, cisgender females (16.8%); transgender individuals of all sexual orientations (17.3%); and highest among bisexual, cisgender males and females (17.6%).

Overall, the unadjusted prevalence of SCD was higher for SGM adults than non-SGM adults (15.7% vs. 10.5%, P < .001; Table 4). SGM adults with SCD were more likely to report that their SCD resulted in an SCD-related functional limitation (60.8% vs. 47.8%, P = .0048). While there was no statistically significant difference between SGM

TABLE 3 Subjective cognitive decline (SCD) for people aged ≥45 years from 25 states by sexual orientation and gender identity (SOGI), BRFSS 2015–2018

Variable	SCD		
	Weighted n = 59,738,450		
	Unweighted n	% (95% CI)	RSE
Heterosexual, cisgender, male	5012	10.7 (10.1–11.2)	2.79%
Heterosexual, cisgender, female	6712	10.4 (9.9–10.9)	5.07%
Lesbian, cisgender female	86	16.8 (10.4–23.1)	19.26%
Gay, cisgender male	129	11.2 (7.6–14.9)	16.37%
Bisexual, cisgender individual	166	17.6 (12.9–22.3)	13.69%
Another sexual orientation,* cisgender, male or female	62	16.5 (7.8–25.3)	27.05%
Transgender individuals (all gender identities /sexual orientations)	64	17.3 (10.5–24.1)	20.09%

Note: Cisgender = not transgender or gender identity aligns with sex assigned at birth; Transgender individuals = transgender women, transgender men, and gender non-binary adults; Another Sexual Orientation* = sexual orientation listed as other.
Abbreviations: BRFSS, Behavioral Risk Factor Surveillance System; RSE, relative standard error.

TABLE 4 Subjective cognitive decline for people aged ≥45 years from 25 states who completed both the subjective cognitive decline and SGM status optional modules, BRFSS 2015–2018

Variable	Sexual and gender minority adults (weighted n = 1,882,629)			Heterosexual, cisgender adults (weighted n = 57,855,821)			
	Unweighted N	% (95% CI)	RSE	Unweighted N	% (95% CI)	RSE	P
SCD	507	15.7 (13.1–18.2)	8.30%	11,724	10.5 (10.1–10.9)	1.84%	< .0001
Functional limitations due to SCD	213	60.8 (52.2–69.3)	7.20%	4039	47.8 (45.9–49.7)	2.03%	.0048
Gave up household activities or chores because of SCD	210	46.0 (36.9–55.1)	10.11%	3730	37.2 (35.4–39.1)	2.50%	.0577
SCD interfered with ability to work, volunteer, or engage in social activities outside the home	271	47.9 (38.7–57.0)	9.73%	5148	34.9 (33.0–36.8)	2.77%	.0045
Ever discussed SCD with a healthcare professional	251	46.8 (37.8–55.8)	9.77%	5535	47.3 (45.4–49.2)	2.06%	.919

Abbreviations: Abbreviations: BRFSS, Behavioral Risk Factor Surveillance System; CI, confidence interval; RSE, relative standard error; SCD, subjective cognitive decline; SGM, sexual and gender minority.

and non-SGM adults in giving up household activities due to SCD (46.0% vs. 37.2%, *P* = .0577), SGM adults were more likely to report that SCD interfered in their ability to work, volunteer, or engage in social activities outside the home (47.9% vs. 34.9%, *P* = .0045). There was no difference in the proportion of SGM and non-SGM adults with SCD reporting ever talking to a health-care professional about their SCD—47% of both SGM and non-SGM adults.

When accounting for demographics (Table 5; Model 1), SGM adults were 26% more likely to report SCD compared to non-SGM adults (aPR = 1.26; 95% CI = 1.05, 1.51; *P* = .0160). When adding unhealthy physical days and any functional limitation (Model 2), SGM adults were 23% more likely to report SCD (aPR = 1.23; 95% CI = 1.03, 1.47, *P* = .0283) compared to non-SGM adults. The difference in SCD by SGM status was further attenuated and no longer statistically significant after accounting for having a past diagnosis of a depressive disorder (Model 3: aPR = 1.15; 95% CI = 0.97, 1.37, *P* = .1162).

4 | DISCUSSION

In this study, SGM adults were more likely to report SCD compared to non-SGM adults. SGM adults were also more likely to report that their SCD resulted in greater difficulties with day-to-day activities and interfered with their ability to engage in activities outside the home. Adjustment for demographics and physical health did not substantially explain differences in SCD for SGM adults compared to non-SGM adults. However, after accounting for a past diagnosis of a depressive disorder, the differences in SCD by SGM status were no longer significant. This suggests that depression may moderate differences in SCD by SGM status. We also found a higher prevalence of self-reported depressive disorders for SGM (28.0% vs. 17.4%; *P* < .0001) compared to non-SGM adults. There is a need to better understand the role of depression and the directionality of associations with SCD. For instance, depression is both a prodromal symptom of cognitive

TABLE 5 Multivariable logistic regression model for subjective cognitive decline (SCD) for people aged ≥45 years from 25 states accounting for demographic, health, and social characteristics, BRFSS 2015–2018

	Model 1			Model 2			Model 3		
Variables	aPR	(95% CI)	P	aPR	(95% CI)	P	aPR	(95% CI)	P
Demographics									
Sexual and gender minority	1.26	1.05–1.51	.0160	1.23	1.03–1.47	.0283	1.15	0.97–1.37	.1162
60 years or older	0.72	0.66–0.79	< .0001	0.82	0.76–0.89	< .0001	0.94	0.87–1.02	.1162
Racial/ethnic minority	1.06	0.96–1.18	.2496	1.05	0.95–1.16	.3384	1.12	1.02–1.23	.0200
Not married	1.09	1.00–1.18	.0406	1.01	0.94–1.09	.7446	0.97	0.90–1.05	.4782
≤High school grad	1.21	1.12–1.31	< .0001	1.08	1.01–1.17	.0328	1.12	1.04–1.21	.0026
Unemployed	2.77	2.51–3.06	< .0001	1.70	1.54–1.87	< .0001	1.50	1.37–1.66	< .0001
Low income, < $20K	1.66	1.50–1.83	< .0001	1.24	1.12–1.37	< .0001	1.16	1.05–1.27	.0039
Uninsured	1.34	1.11–1.61	.0031	1.40	1.19–1.65	.0001	1.40	1.19–1.64	< .0001
Health									
Functional impairment (any)				2.74	2.50–3.02	< .0001	2.30	2.09–2.53	< .0001
Frequent physical unhealthy days (14+ days)				1.80	1.64–1.98	< .0001	1.60	1.46–1.75	< .0001
Depressive disorder							2.44	2.26–2.63	< .0001

Notes: Model 1 = Demographics; Model 2 = Model 1 + Functional Impairment and Unhealthy days; Model 3 = Model 2 + Depression.
Unweighted n = 96,912 (weighted n = 48,943,800).
Abbreviations: aPR, adjusted prevalence ratio; BRFSS, Behavioral Risk Factor Surveillance System; CI, confidence interval.

impairment and may have direct and negative impacts on memory and concentration over time.[20] Future research examining the role of depression in SCD and screening for depression when indicated in health-care settings among SGM adults should be considered.

Several studies found a higher prevalence of SCD and cognitive impairment among SGM populations. A study involving 210 SGM adults aged 50+ found that 25% experienced SCD, which was associated with functional limitations and depression—a similar finding to our study.[11] SGM adults with SCD in this study were more likely to experience limitations doing activities outside the home and functional limitations due to SCD. A recent systematic review found that functional limitations/complaints of limitations in activities of daily living in persons with SCD were associated with a greater risk for progression to cognitive impairment and dementia.[21] Another study found higher rates of self-reported cognitive difficulties among racial/ethnic minorities, gender minorities, and those who identified their sexual orientation as other.[12] Finally, a study using only the 2016 BRFSS found no difference in SCD by SOGI; however, only eight US states administered both the SOGI and SCD modules in 2016, which resulted in a smaller sample of SGM adults (n = 1094) compared to our study.[22]

Another study using data from the National Alzheimer's Coordinating Center found no difference in risk of objective cognitive impairment (MCI and dementia) for same-sex couples compared to opposite-sex couples.[13] The researchers noted several study limitations in terms of recruitment bias, non-probability sampling, and potential biases in reporting and ascertainment.[13] Additional recent studies using data from the Health and Retirement Study and the National Social Life, Health, and Aging Project have found higher rates of objective cognitive impairment among same-sex couples and sexual minorities

compared to opposite-sex and heterosexual adults, respectively.[23,24] There is a need for future research on SCD and ADRD risk among SGM older adults, including differences for gender minorities including people who self-identify as heterosexual or a sexual minority, non-binary, intersex, or another gender identity or gender expression, as well as differences by age, gender, income, education, and race and ethnic identities.

Reasons for the higher prevalence of SCD in SGM older adults require further study. First, SGM older adults may experience a higher prevalence of health conditions associated with ADRD compared to non-SGM adults. Studies found high rates of cardiovascular disease,[25] hypertension, diabetes,[8] and depression[8–10] in subgroups of SGM older adults. The high rate of depression in SGM older adults is alarming given depression is associated with a 2- to 3-fold increased risk for ADRD.[26,27] The direction by which depression impacts SCD requires further study. For instance, a meta-analysis found that SCD was independently associated with both objective cognitive function and depressive symptoms.[28] Future research examining the complexity of these relationships and if there are different subtypes of SCD with or without depression that may lead to future cognitive decline and dementia is needed.

There may be protective factors or resilience experienced by SGM older adults as well that may mitigate risk for ADRD, such as greater access to chosen family and community support[29–32] and higher educational attainment (e.g., more likely to be a college graduate).[8,25,33] However, these past findings may be due to healthy volunteer bias; increased participation by SGM older adults with greater resources; and underrepresentation of those who identify as racial, ethnic and/or gender minorities.

Another reason for higher rates of SCD found in this study may be due to minority stress.[34] Minority stress stems from expectations of rejection; concealment of SOGI; internalized homophobia and/or transphobia; and experiences of physical, mental, and/or social harm.[35] SGM populations may also experience other forms of discrimination based on their race, ethnicity, gender, age, immigration status, and/or social class. Research has linked experiences of minority stress with greater health conditions and depression in SGM populations.[36–40] We could not identify any published studies on minority stress and SCD or cognitive impairment in SGM populations. Studies with Black older adults have shown a relationship between higher perceived discrimination (a marker of minority stress) and lower episodic memory,[41] and declines in global cognition, episodic memory, and visuospatial ability.[42,43] Research is needed to understand the link between minority stress and cognitive health over the life course in SGM and other understudied populations.

There are several limitations to this study. First, we used multiple years of the BRFSS, but each year was cross-sectional so no longitudinal conclusions can be made. This study also relied on self-reported SCD. Future research using clinical measures of cognitive function among SGM populations is needed. The data in this study were from two optional BRFSS modules and only representative of the 25 states that collected these data from 2015 to 2018.

There may have also been an underreporting of SGM status given the higher frequency of "don't know" and "refused" for SOGI questions. This may be due to participants having a lower level of comfort in disclosing, given their past experiences of stigma and discrimination.[44] However, underreporting SOGI would result in a bias toward the null or no difference in SCD by SGM status, and past research suggests a low rate of overreporting and that self-reporting of SOGI data among adults has good reliability and stability.[45,46] Additionally, there was flexibility in how the Spanish version of the SOGI questions may have been translated by participating states. This might have impacted how respondents chose to respond to the SOGI questions and possibly resulted in an over- or under-reporting within SOGI categories. Finally, interviews for participants who did not respond to the sex verification question were terminated, and their data were not included because the sex variable is required for weighting of BRFSS data. This might have resulted in an undercount of individuals who identify as neither male nor female.

Finally, it is not known if, or to what extent, the measure of SCD used in this study is linked to potential future risk for ADRD. According to the SCD Initiative conceptual framework for research,[1] there is an increased likelihood of preclinical Alzheimer's disease if participants report: (1) subjective decline in memory, (2) onset of SCD in the past 5 years, (3) onset of SCD at age 60+, (4) worrying about their SCD, and (5) participants believing that their cognitive performance is worse than others of the same age. The BRFSS Cognitive Decline module does not address all five criteria. For instance, this study was limited in terms of the proportion of SGM adults aged 60+. Future research with older SGM populations is needed to clarify the extent to which SCD differs in subgroups who are aged 60+. However, questions for the BRFSS SCD module were designed, tested, and implemented as part of *The Healthy Brain Initiative: The Public Health Road Map for State and National Partnerships, 2013–2018 (Road Map)*,[47] with the goal of creating a population-based approach to promote cognitive health and identify cognitive impairment. Moreover, research has shown the SCD-categorizing question used in the BRFSS Cognitive Decline module is independently associated with lower cognitive performance in older adults.[48]

Findings from this study highlight the need for continued research on cognitive decline in SGM populations, especially in those with depression. It has been estimated that up to a million SGM older adults will be living with ADRD in the next 10 to 20 years.[49] Currently, very few studies have examined SCD or cognitive outcomes among SGM populations and there is a need for research on the differences in the health and social needs of SGM populations living with SCD and ADRD. Moreover, studies with older populations should consider adding SOGI questions. For studies with gender minorities, an inclusive, two-step approach to assessing gender identity, in which participants are first asked about their gender identity and then asked about the sex they were assigned at birth is preferred. There is also a need for designing and testing the impact of culturally relevant interventions and inclusive services for SGM adults living with cognitive impairment.[12]

Several health and social factors more prevalent among older SGM populations should be considered in future research, such as social isolation, depression, functional limitations, the role of aging with HIV/AIDS, reluctance to access health care and social services due to fear of discrimination, and the lack of access to informal caregiving and aging-related supports for SGM people living with cognitive impairment.[12] Health professionals providing care to SGM people, especially those living with SCD and functional limitations, should consider creating welcoming environments that allow SGM people to freely express their identities and be respected and valued members of these communities. Health-care organizations may want to consider employing SGM people; training staff to use inclusive language; revising intake and data collection forms to ensure collection of SOGI data, pronouns, and names; diverse relationship statuses; and understanding there is a need for respecting all individuals' differences.[50] Improving care and ensuring a welcoming environment for SGM adults will likely result in improved care for all, including adults who experience increased risk for cognitive decline.

AUTHOR CONTRIBUTIONS

J.D.F., E. C., and C. A. T. were responsible for the study concept and design. C.A.T. was responsible for data analysis. J.D.F., E. C., N. H. L.,

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